



## Basic Data Unit Field Services Section Hydrology Division

### Basic Data Unit

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## Groundwater Data Collection

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Manual Water Level Measurement

### Data Collection Basics

Staff from BD unit, which include hydrologists and water resource specialists, measure water levels in wells, collect water quality samples, measure discharge from pumping wells, and conduct well inventories throughout the State of Arizona. BD unit collects groundwater and surface water data statewide, provides field staff for other parts of ADWR, produces Hydrologic Map Series (HMS) that show groundwater conditions statewide, and maintains a groundwater database containing information on groundwater levels statewide.

BD unit visits about 5,000 wells statewide each year and makes an intensive effort to measure groundwater levels in at least one groundwater basin or Active Management Area (AMA) each year. BD unit also collects several hundred water quality samples annually. Water level and water quality data may be found in the ADWR's Groundwater Site Inventory (GWSI) database which BD unit maintains. GWSI is a field verified database consisting of thousands of wells; including cadastral and GPS locations, current and historical water level measurements and numerous associated data relating to those wells.

To view the GWSI database please visit:

<http://www.azwater.gov/azdwr/gis/>

### Basic Data Unit History

The Arizona Department of Water Resources (ADWR) has been in existence since 1980. Before becoming an agency, ADWR was known as the Arizona Water Commission (a much smaller group), which was a part of the Arizona State Land Department. The Basic Data (BD) Unit has been the data collection arm of ADWR since the beginning. The unit was patterned after similar data collection units in the United States Geological Survey (USGS). ADWR adopted all data collection protocols from the USGS, including field inventories, water level measurement, water quality sampling and discharge measurement. This enabled the data that ADWR collected to have instant compatibility with all USGS historical data.



Automated Remote Monitoring

## Overview Of Groundwater-Level Collection Methods

One of the Primary types of hydrologic data collected by ADWR is groundwater level data. Methods that ADWR uses for groundwater level data collection include the following:

### Automated Sites

These sites utilize groundwater monitoring devices that record water levels on a predefined frequency and a continuous basis. The Department uses



Automated Well

both real-time (satellite-linked) and non-real-time automated recording systems (transducers and shaft encoders). See State-wide Automated Monitoring Fact Sheet for more details.

### Manual (Conventional) Methods

These data are collected by using electric sounders or steel tapes that take discrete measurements at selected intervals (usually only one measurement per year).

### Index Lines

Index lines are groups of wells that are visited once each year by ADWR field staff and measured manually with a device called a sounder. Data are recorded using a tablet PC and uploaded into the ADWR's GWSI database upon

return to the office. Data for these wells are used to monitor groundwater levels throughout the state. About 1,700 wells are measured annually through the index line program.

### Basin Sweeps

A basin sweep is an intensive effort within a groundwater basin to measure as many wells as necessary in order to provide a comprehensive picture of the groundwater system. In the Phoenix AMA for example there are about 2,200 wells measured every five years. The resulting water level data support a number of water management and hydrology programs, as well as cities, consultants, and private individuals.

### Recent Activities

In the winter of 2007-2008, the Pinal AMA, Gila Bend, Big Sandy, Tonto Creek, and Agua Fria basins were measured. In the winter of 2008-2009 the Phoenix AMA, Prescott AMA, and the Verde River basins are scheduled to be measured. Annual index well measurements have also been performed.



Index Well

## Additional Types of Data Collection

### Statewide Hydrologic Monitoring Program

ADWR is tasked with providing stewardship of the State's precious and limited groundwater resources through active management and enforcement of the Arizona Groundwater Code. ADWR's BD unit engages in a wide variety of data collection activities in support of public needs, such as the Assured and Adequate Water Supply and Recharge Programs, Drought Monitoring Program, well drilling and well impact assessments, and in support of hydrologic studies such as groundwater modeling and water budget development.

In addition to groundwater levels, the BD unit also collects data for:

- Stream Flow
- Crop Surveys
- Well Discharge
- Water Quality

This data is used to provide better hydrologic data in many parts of the State and to devote more attention to ensuring that activities are coordinated so that the information gathered and products produced are made widely available. There is

also a need to collect additional data in areas of the state subject to rapid change, such as developing areas or areas sensitive to change.



Crop Surveys and Water Use



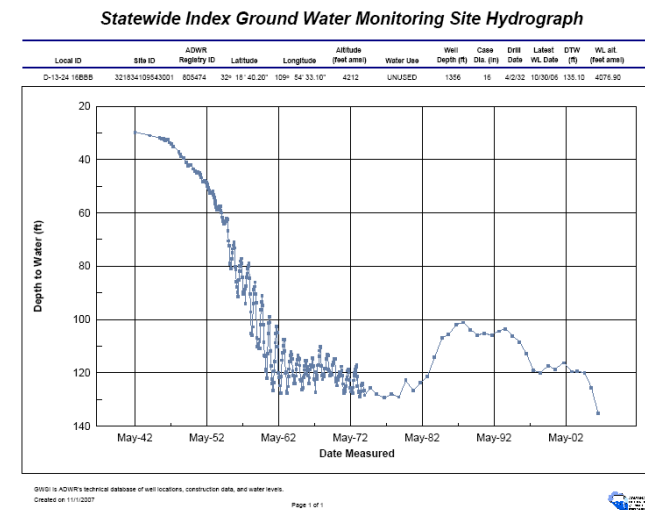
Stream Flow Measurements



## What are the data used for and who uses it?

ADWR uses the information gathered by the Basic Data Unit to develop water level maps and reports. This valuable information is also used to support scientific, planning, and management studies of each basin's aquifer system. The BD unit produces the Hydrologic Map Series (HMS) reports, which show groundwater conditions statewide. Each of the HMS reports are dedicated to an individual groundwater basin and are prepared using data collected by the BD unit. Water Level Change Map Series (WLCMS) reports show water level changes between the two most recent basin sweeps.

The BD unit staff will conduct three basin sweep investigations, service and maintain all analog recorders & transducers, install new transducer sites, and measure all 1,700 index wells (statewide). From Oct. '03 to Apr. '04, the BD unit staff measured approx. 4,000 new water



### Who uses our data?

1. ADWR
2. State and Federal Agencies
3. Municipalities and Cities
4. Power Providers
5. Consultants
6. Developers and Real Estate Professionals
7. Universities and Students
8. Farmers and Ranchers
9. Well Drillers
10. General Public

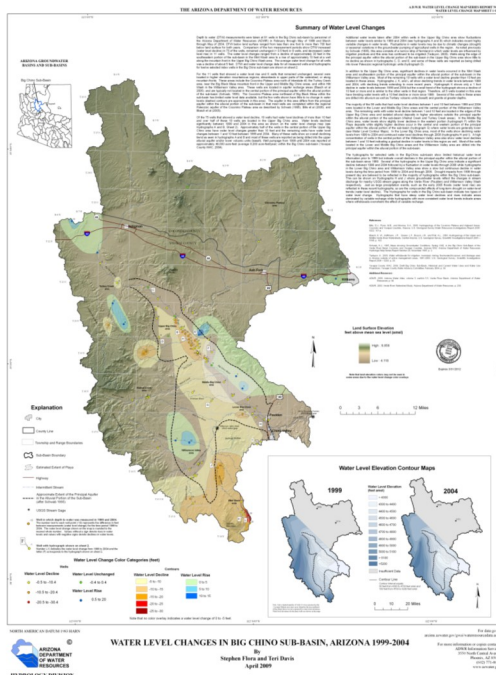
Shown left: Hydrograph of one of the 1,700 Index wells statewide.

levels statewide, in addition to the thousands of water levels recorded by our continuous monitoring sites.

This data is added to the GWSI data base in a timely fashion, and thereby made available throughout ADWR and to the public. The data is then used to produce one to two HMS reports and three to four WLCMS reports per year. HMS and WLCMS reports are listed below.

### What are the data used for?

1. Resource management (especially critical in drought)
2. Preparation of groundwater models (Input and calibration)
3. Map construction (depth to water, flow direction, water levels)
4. Reporting hydrologic conditions throughout the state
5. Development of annual water budgets
6. Determining assured water supply
7. Growth and development planning (urban and rural)
8. Locating areas of concern and monitor groundwater mining
9. Develop hydrographs and water level trends



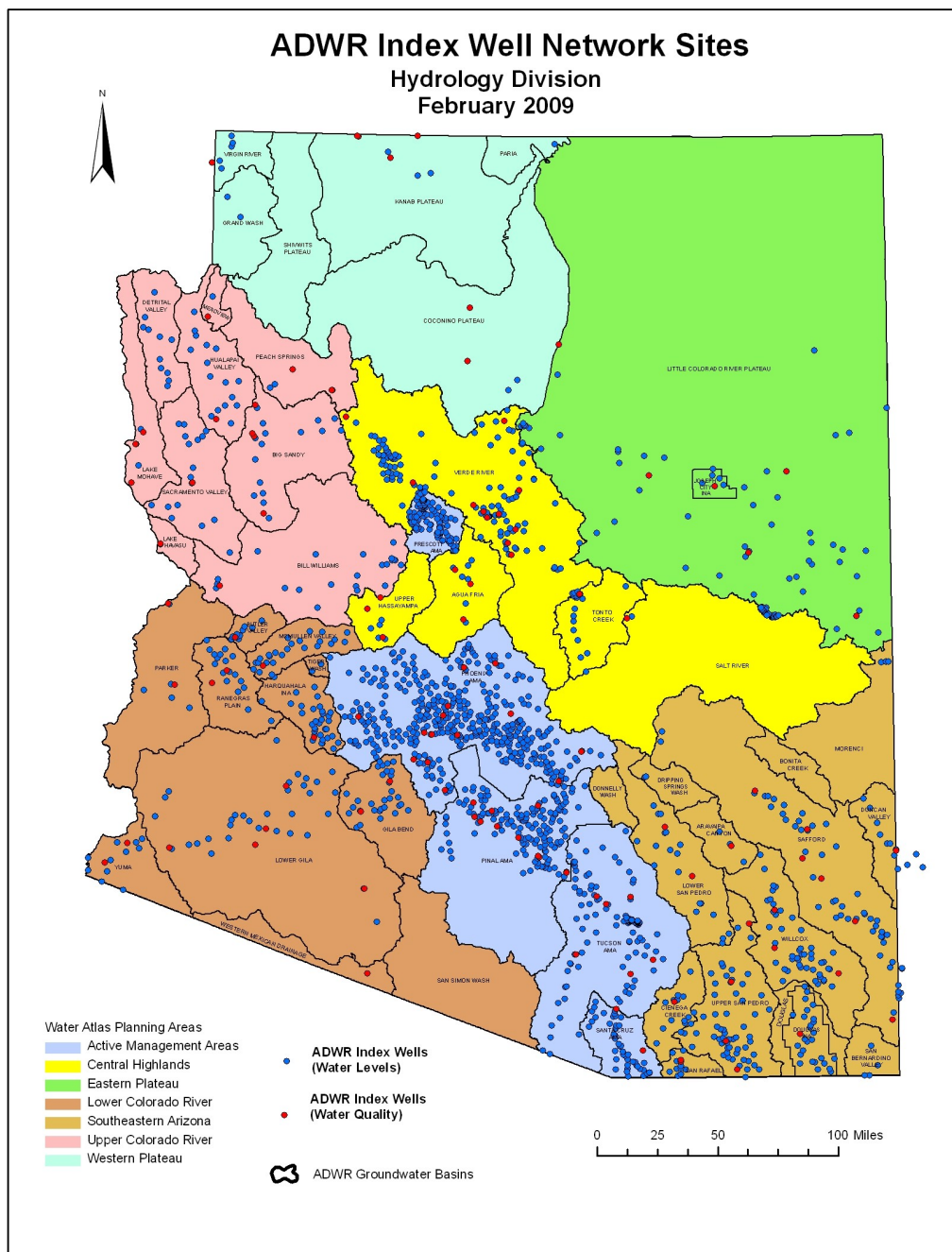


Water Level Measurement Collected from a Pumping Well

**“ADWR uses the information gathered by the Basic Data Unit to develop water-level maps and reports. This valuable information is also used to support scientific, planning, and management studies of each basin’s aquifer system.”**



One of over 1,800 Index Wells Located Across Arizona



## Current Statewide Status

The current ADWR statewide Index well monitoring network is shown above and includes over 1,800 wells. Approximately 1,700 of the Index wells are manually measured for groundwater levels and 100 Index wells are measured for groundwater quality on an annual basis.

To view a current map showing all of ADWR's Index well monitoring sites please visit:

<https://gisweb.azwater.gov/waterresourcedata/GWSI.aspx>